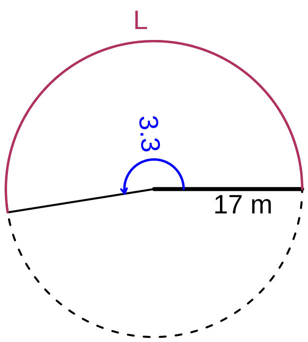
Name: Date:

Trig Final (SLTN v626)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 3.3 radians. The radius is 17 meters. How long is the arc in meters?



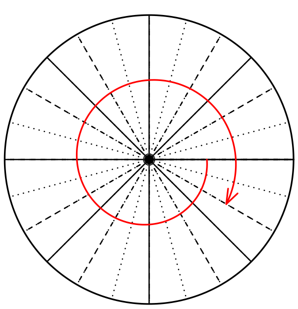
$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

$L = 56.1$ meters.

Question 2

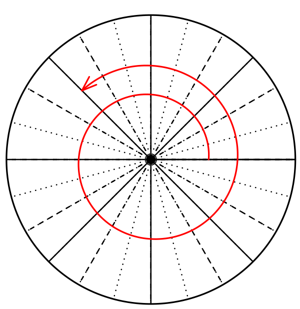
Consider angles $\frac{-13\pi}{6}$ and $\frac{11\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-13\pi}{6}\right)$ and $\sin\left(\frac{11\pi}{4}\right)$ by using a unit circle (provided separately).

Mark $\frac{-13\pi}{6}$



Find $\cos(-13\pi/6)$

Mark $\frac{11\pi}{4}$



Find $\sin(11\pi/4)$

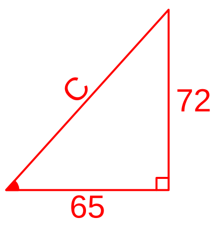
$\cos(-13\pi/6) = \frac{\sqrt{3}}{2}$

$\sin(11\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\tan(\theta) = \frac{72}{65}$, and θ is in quadrant III, determine an exact value for $\sin(\theta)$.

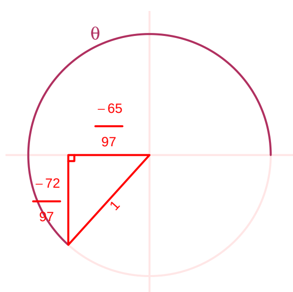
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$65^2 + 72^2 = C^2$$
$$C = \sqrt{65^2 + 72^2}$$
$$C = 97$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\sin(\theta) = \frac{-72}{97}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 3.64 Hz, an amplitude of 5.33 meters, and a midline at $y = -7.74$ meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -5.33\sin(2\pi 3.64t) - 7.74$$

or

$$y = -5.33\sin(7.28\pi t) - 7.74$$

or

$$y = -5.33\sin(22.87t) - 7.74$$